NAVAL POSTGRADUATE SCHOOL
Monterey, California

EC 3550 MIDTERM II 11/87Po

- This exam is open book and notes.
- There are four problems; each is equally weighted.
- Partial credit will be given; be sure to do some work on each problem.
- Be sure to include units in your answers.
- Please circle or underline your answers.
- Show *ALL* work.

1	
2	
3	
4	
Total	

Name: _____

1. An OTDR produces a trace as shown below.

Figure 1: Problem 1

   (a) Calculate the losses on sections A, B, and C as marked.

   (b) Calculate the loss at the joint X.

2. A fiber proof–tested at 0.5% strain has a certain predicted minimum lifetime in an application. The same fiber when proof–tested to 1% strain will have its minimum lifetime increased by a factor of 65,000. By what factor would the minimum lifetime be increased (compared to the 0.5% strain fiber) if the fiber is proof–tested to 1.5% strain.

3. The quantum efficiency of an APD is 80% for the detection of light at 900 nm. When the incident light power is 0.5 μW, the output current of the APD is 11 μA.

   (a) Calculate the multiplication factor M.

   (b) Calculate the generation rate of hole–electron pairs in the device.

4. Consider the reflection technique used to characterize the step index refractive index profile of a preform. The *sensitivity* S of the measurement is defined by

$$S = \frac{dR}{dn_1} \tag{1}$$

   where R is the reflectivity of the fiber ($= P_r(r)/P_i$). Calculate the value of S in the core of a fiber if $n_1 = 1.45$.